

# Investigation of antimicrobial usage by veterinary surgeons in dogs and cats

## Background

- Antimicrobial usage in human medicine has been associated with the resurgence of antimicrobial resistance (AMR). This has led to the development of prescribing guidelines to prevent the emergence of AMR in potential human pathogens and loss of efficacy of critically important antimicrobials in human and veterinary medicine<sup>1,2</sup>. Antimicrobial treatment failure and AMR infections in human medicine have been associated with increased morbidity and mortality rates<sup>2</sup>.
- All groups of antimicrobials are currently used in veterinary medicine. Although there are currently guidelines and monitoring of antimicrobial usage in production animals because of food safety concerns, there is limited knowledge of prescribing practices in dogs and cats by veterinary surgeons and actual antimicrobial usage at practice level.

## Aims & Objectives

### Aim

To assess antimicrobial usage and prescription practices in dogs and cats.

### Objectives

- To quantify and characterise patterns and trends of antimicrobial usage in a convenience sample of veterinary practices in the UK by analysing data from electronic records from practice management systems (PMS).
- To investigate behaviours associated to non-adherence to prescribing practices by veterinary surgeons by applying social analysis tools.

## Materials & Methods

- For the purpose of this study, a convenience sample of veterinary practices ( $n=12$ ) in the UK were selected from the Royal College of Veterinary Surgeons Directorate (Figure 1). Selection was based on small animal workload and use of electronic PMS (RxWorks).

- All practices but one (number 5- referral practice) were first opinion practices; 75% classified as "small animal only" practices ( $n=9$ ) and 25% as "mixed" practices ( $n=3$ ).

- Antimicrobial active substances were grouped according to indication through the Anatomical Therapeutic Classification system (ATCvet) (WHO Collaborating Centre for Drug Statistics Methodology, 2008). Antimicrobial usage data was extracted from the PMS through Access (Microsoft Corp) queries.

- Descriptive analysis was conducted through SPSS 17.0 statistical software (SPSS Inc). Both systemic and topical antimicrobials were considered for analysis. Clinical data was evaluated for the period between the 1<sup>st</sup> of January and the 31<sup>st</sup> of December 2007.

- Incidence rates of antimicrobial prescription and usage. Incidence rates were calculated taking in consideration the population at risk (dogs and cats) visited over the study period. For this effect were also considered the number of antimicrobial usage or prescription of antimicrobial preparations in the species considered.

- For the purpose of assessment of antimicrobial usage, each of the active antimicrobial substances in the drug preparations was considered separately as a prescribed active substance.

- The licenses of antimicrobial preparation was checked against British veterinary (National Organisation for Animal Health) and human drug compendiums (British National Formulary).

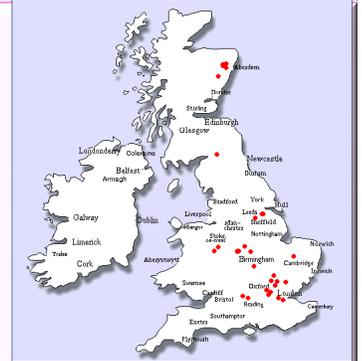


Figure 1- Distribution of participating practices and respective branches in the UK.

## Preliminary results

Table 1- Main antimicrobial groups used in the participating veterinary practices in dogs and cats. The values circled in red correspond to critically important antimicrobials usage. Each active antimicrobial in a preparation was counted as an antimicrobial prescription in drug preparations with more than 1 antimicrobial.

Prescription of antimicrobials	N	Mean	Median	Min	Max
<b>All groups</b>	74516 (100%)	6209.7	5453.5	1899	15706
Overall	44791 (60.1%)	3732.6	3355	1156	9775
<b>β-Lactams</b>					
Penicillins	34618 (46.5%)	2884.8	2617	1043	8392
Cephalosporins	10173 (13.7%)	847.8	466	113	2129
<b>Fusidic Acid</b>	7959 (10.7%)	663.3	563.5	136	1860
<b>Aminoglycosides</b>	5647 (7.6%)	470.6	364.5	168	1221
<b>Quinolones</b>	3700 (5%)	308.3	332	95	565
<b>Lincosamides</b>	3615 (4.9%)	301.3	263	152	570
<b>Polymyxins</b>	2162 (2.9%)	180.2	184.5	20	379
<b>Nitroimidazoles</b>	2093 (2.8%)	174.4	147.5	0	504
<b>Tetracyclines</b>	1889 (2.5%)	157.4	155	10	303
<b>Other</b>	2957 (4%)	246.4	138	0	980

- Incidence rates of antimicrobial prescriptions in dogs and cats per 1000 patients-year were **1145.6** and **747.8**, respectively.

- Incidence rates of antimicrobial prescriptions in dogs and cats per 1000 visits-year were **261.4** and **226.2**, respectively.

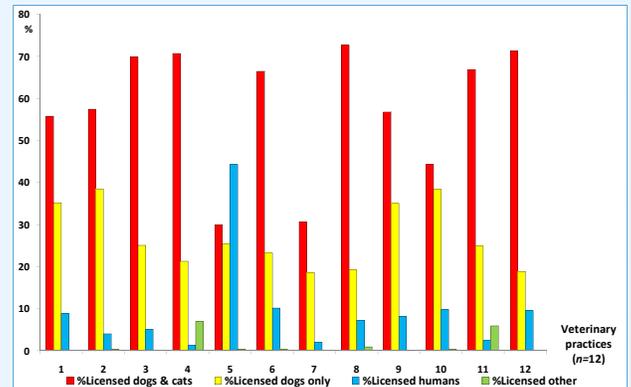


Figure 2- Licensing of antimicrobial preparations administered to dogs and cats. For most of the participating practices, preparations were either licensed for both dogs and cats or dogs only. Practice 5 showed high use of extra-label drug preparations (referral practice), contrary to the first opinion practices.

## Further work

- Investigation of relationships between variables at different hierarchical levels through multilevel modelling (MLwiN, Bristol University)



- Assessment of adherence to prescribing guidelines for the prudent use of antimicrobials in 3 practices (pilot study).
- Definition of local Animal Daily Dosages (ADDs) for the quantification of the main antimicrobial groups administered to dogs and cats.
- Investigation of behaviours associated with decision-making process in the selection of antimicrobials for usage in dogs and cats through social sciences tools.

## Discussion

- Critically important antimicrobials such as penicillins, cephalosporins, aminoglycosides, quinolones and tetracyclines were amongst the most commonly used or prescribed antimicrobials in dogs and cats (Table 1). Previous studies in Australia and Finland<sup>3,4</sup> have reported similar findings. However, these findings need to be interpreted carefully as the measurement units applied in this study were not standardised and as such, comparison with other studies may not be accurate.

- Antimicrobial preparations administered were either licensed for both dogs and cats or dogs only. A small proportion of preparations (2.1%-10.4%) were administered or prescribed as extra-label drugs under the Cascade principle (Figure 2). The exception was practice 5 (referral practice), in which a high proportion of antimicrobials not licensed for use in dogs and cats (44.6%) were administered to these species.

- Incidence rate of antimicrobial prescriptions was considerably higher in dogs (1145.6) than in cats (747.8) per every 1000 animals visited in a year. Antimicrobials were administered or prescribed to over a quarter of dog visits. In cats, the prescription of antimicrobials per 1000 visits was slightly lower than in dogs visited. However, these results would need to be interpreted in the context of the conditions suffered by the animals and culture and antimicrobial sensitivity laboratorial results in order to be able to assess for adherence to prescribing guidelines.

## References

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